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Information Feasability: Using the Concept for Planning the Information Needs of Deploying Forces

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Abstract

Information superiority seeks to ensure that force elements receive the right information at the right time to optimally influence the outcome of an operation. Currently the ad hoc planning for force information exchanges does not optimally support early dominance and rapid mission success. This paper proposes that Information Feasibility be used in advanced planning of C2 information distribution requirements. Information feasibility analysis is a concept that treats information advanced planning requirements in a way that is very similar to that of other force deployment needs. An example is provided using a set of validated Information Exchange Requirements (IERs). The paper concludes that an Information Plan derived from Information Feasibility analysis and based on prioritized IERs, is the way to improve advance information planning, especially in a coalition environment where pre-deployment planning is often limited.

KEYWORDS: Information Superiority
Information Feasibility
Information Exchange Requirements

Foreword

This paper was written for presentation at the 5th International Command and Control Research and Technology Symposium (ICCRTS), Canberra, Australia. The 5th ICCRTS is co-sponsored by the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence (ASD [C3I]) C4ISR Cooperative Research Program (CCRP) and the Australian Department of Defence, Defence Science and Technology Organisation. The theme of the symposium is "Thinking Together".

The CCRP focuses upon improving both the state of the art and the state of the practice of command and control. As ASD (C3I)'s executive agent for the CCRP, the director has the mission of improving DOD's understanding of the national security implications of the Information Age, helping DOD take full advantage of the opportunities afforded by technology, bridging the operational and technical communities, and enhancing the body of knowledge and research infrastructure upon which future progress depends.

The CCRP pursues a broad program of research and analysis in command and control (C2) theory, doctrine, applications, systems, and the implementation of emerging technology. It also develops new concepts for C2 in joint, combined, and coalition operations in the context of both traditional and non-traditional missions (e.g., Operations Other Than War). Additionally, the CCRP supports professional military education in the areas of C2 and related technologies. To complement research, the CCRP provides a clearinghouse and archive for C2 research, publishes books and monograms, and sponsors workshops and symposia. Additional information on the CCRP is available at: http://www.dodccrp.org

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Section 1

Introduction

Information superiority is a force multiplier. The concept of information superiority seeks to ensure that the warfighters receives the right information[1] at the right time to optimally influence the outcome of an operation. Although detailed communications needs are frequently included in Operation Plans (OPLANs)[2], higher levels of information requirements, e.g., nodes where information is needed, automated information systems, and worldwide access to information are rarely addressed. As a result, the physical forces/units that are put in place to execute the operation must scramble to coordinate and establish the needed communications and access to information. This often results in a less than optimal command and control (C2) capability, sometimes for an extended time period. In recent engagements poor C2 in the early hours of force employment has had a negative effect on the military objective to quickly bring a strong and decisive force to bear on the adversary. For this reason every information exchange deficiency must be addressed in order to *assure* that forces will deploy fully equipped for early and decisive information superiority.

The task of establishing effective C2 and communications could be enhanced if the planners placed increased attention on information needs and requirements throughout the planning cycle and in each OPLAN. Information planning needs to be conducted in a manner similar to that for physical forces. The goal of information planning is to determine, in advance, the type of information employed, nodes providing and distributing information, the nodes requiring and accessing information, the deployment sequence of systems to provide the information, plus information operations considerations (including information warfare). The effect of advanced information planning activities is the establishment of a C2 information infrastructure, which fully supports the essential activities of a joint, multinational, or coalition force[3].

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1 Information is the facts, data, or instructions in any medium or form. [JPub 1-02, 2000].

2 OPLAN-any plan, except for the Single Integrated Operation Plan, for the conduct of military operations. Plans are prepared by combatant commanders in response to requirements established by the Chairman of the Joint Chiefs of Staff and by commanders of subordinate commands in response to requirements tasked by the establishing unified commander. OPLANs are prepared with the appropriate annexes, appendixes, and Time Phased Force and Deployment Data files/database as described in the Joint Operation Planning and Execution System manuals containing planning policies, procedures, and formats [JPub 1-02, 2000].

3 Joint connotes activities, operations, organizations, etc., in which elements of two or more US Military Departments participate. Multinational indicates that a formal and long-standing defense agreement exists between nations. Coalition refers to ad hoc operations where long-standing defense alliance between participating nations may not exist.

Section 2

The Need

A planned C2 information infrastructure is desirable for several reasons. According to a 1999 National Security Space Architect Mission Information Management (MIM) Report, "Information integration provides the mechanism to transform data into information, and information into knowledge. Today, integration is managed in an ad hoc manner, thereby precluding the potential benefits of programmatic style management." The MIM team concluded that information management across the Department of Defense (DOD) is decentralized and uncoordinated, resulting in an infrastructure, communications, and network which are inadequate to support the information enterprise [NSSA, 1999][4].

One of the reasons that communications systems and networks are inadequately managed is because the information needs of the users are poorly defined. This leads to an uncontrolled expansion of communications media during a force deployment in order to facilitate the ever-expanding need for information exchanges. All forces, including multinational and coalition, must be able to communicate and operate safely and effectively wherever and whenever they deployed and employed. Information exchange improvements should also stress reduced life cycle equipment costs and increased interoperability among cooperating forces. The operations infrastructure must also accommodate communications enhancements including integrated command, control, communications, computer, intelligence, surveillance, and reconnaissance (C4ISR) planning for information exchanges. The goal of these initiatives must be reliable, timely, relevant C2 information exchange assurances for the warfighter or peacekeeper.

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4 The focus of the MIM study is the national security architecture for the mission information enterprise in the 2010-2025 era.

Section 3

The Challenges

The most prominent challenges are attributable to technology, architecture limitations, and multinational partner relationships and restrictions.

3.1 Technology

Technology enables the transfer of massive amounts of information over worldwide networks and the infusion of this information into all activities of the warfighter. The capability has been so successful that it is now widely regarded as essential to everyday operations. What technology has not provided is an orderly and user-friendly information deployment and employment environment. For example, if different nations have integrated different levels of technology into their systems, a timely exchange of information could be difficult. The changes that must be made to make the deployment more effective and efficient is one challenge. The steps needed to eliminate data conversion and establish more responsive interfaces is another. The first step in correcting these discrepancies is to determine what information needs to be passed. Once the information needs are established, the technical arrangements usually can be made. The reward for progress in this area is a reduction in the time and cost of future systems development and maintenance, and most importantly, the presentation of concise and unambiguous information to those who need it, when they need it.

3.2 Architecture Limitations

The Commander in Chiefs (CINCs) have a key role in determining what capabilities their supporting commands and agencies develop and maintain. It is especially important that these needs be clearly articulated to the component commands in the form of capability requirements. The architectures developed by the CINCs must also focus on utilizing the forces and assets provided by the component commands in a joint and multinational environment. The primary goals of a CINC's architecture should, therefore, be to articulate *what is needed* from the components, *when it is needed*, and *how it must interface* so as to produce maximum effectiveness when employed [Beckner and Norman, 1998]. In the past, architectures in general were a weak link in the process. More recently, commanders have begun to recognize the value of architecture products to define the present and future needs of their forces. The standardization of architecture formats and products in accordance with the C4ISR Architecture Framework [C4ISR, 1997] has done much to correct the deficiency, but a major challenge remains-focusing on information content and use.

3.3 Multinational Partner Relationships and Restrictions

The role that multinational partners play in operations in which the United States (US) DOD participates should be reflected in US Operational Architectures and CINC OPLANs. Civil contingencies or initiatives that involve multinational partners should also require the agency that is cognizant of the situation to include capabilities planning for that situation in their architecture process as well. A total sharing of information between the US and other nations will probably never be possible due to the security and sovereignty constraints of the nations involved, mission boundaries and system limitations, and even cultural differences [Beckner, 1997]. Steps should be taken, nevertheless, to establish the necessary interfaces and agreed upon information that can be exchanged. To do otherwise is counter-productive to successful multinational and coalition operations. Fortunately, C2 information exchange planning initiatives are currently underway between some US-Pacific allies.

3.4 OPLAN Deficiencies

The purpose of the OPLAN is to reduce force deployment and employment time and ensure immediate military effectiveness upon arrival of forces in the theater. The OPLAN documents force structure and supports pre-planning that can quickly be put into practice[5]. The creation of OPLANs includes significant attention to detail concerning courses of action, types of forces, specific units, deployment sequences, transportation assets, unit readiness, etc. These are primarily based upon the physical attributes required to successfully accomplish the mission—be it engage in combat or provide humanitarian relief to hurricane victims. The information exchange aspects of past OPLANs has not received the attention given the physical aspects. This is being corrected, especially by some theater CINCs.

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5 See Armed Forces *Staff College Joint Planning Orientation Course, Vol. I* for a complete discussion of OPLAN development and structure.

Section 4

Information Feasibility

Information feasibility is a process to determine the degree to which US and multinational/ coalition information system providers can deliver information to meet the required operational needs of forces in their deployed environment. Information feasibility supports the concept of information superiority and can be used in prioritizing "information deployment and employment" strategies, techniques, and deficiency analysis.

Information feasibility analysis can determine many factors, including whether or not specific operational information requirements are completely satisfied. It can also be used to determine if a specific Automated Information System (AIS) is accessible at a node designated in the OPLAN, whether the data managed by the AIS supports the operation and its deployment/employment criteria, and whether communications systems and workstations exist to access the information. Information feasibility analysis may also assist in developing a prioritization schema on the value of specific information to the overall operation [Norman, 1997].

4.1 The Concept

The basic objective of information feasibility is to plan operational information needs and requirements in a way very similar to that of any other operational need. For example, if a force is anticipating deployment, much deliberate planning is accomplished to ensure that the appropriate personnel, weapons, systems, and support (food, medical, transportation, etc.) are selected, prepared for the deployment, and sequenced logically for delivery to the force elements in the theater.

Advanced planning is often accomplished and retained in documents such as an OPLAN. Additional information required to implement an OPLAN may be found in supplemental documents that are not integral to the OPLAN itself. With regard to information management, satellite and other networks are identified in general terms in an OPLAN. Lacking is the specific information needs required at specific times to accomplish the mission of the deploying force. Currently requirements of this type are not defined either in the OPLAN or any of its supplemental annexes. The information feasibility concept can address this deficiency.

4.2 The Process

Architectures are a mechanism for understanding and managing complexity. The goal of well-constructed architectures is to improve capabilities by facilitating the synthesis of requirements with sound investments. In the past, C2 systems and information exchange requirements were developed haphazardly and inconsistently during the design and acquisi-

tion of stand-alone systems and capabilities. Times have changed. The present and projected requirements are for global information grids and systems that function as nodes in the global information system. Today information (e.g., data, voice, imagery and video) is bursting the bonds of stand-alone systems and is becoming the primary traveler in the global infosphere. The information feasibility concept is a facilitator for an orderly process of information "deployment". Architecture-driven OPLANs will be the vehicle for planning the employment of multinational and coalition forces. Establishing information feasibility analysis in the OPLAN planning cycle does not require revolutionary change to established procedures. It is, instead, the extension of processes currently in effect. Information feasibility analysis provides an OPLAN with a process for determining the operational requirements for C2 information management that parallels, for example, the established process for transportation feasibility analysis.

Transportation feasibility is assessed for OPLANs to ensure transportation assets are available to move forces from their source location to their destination nodes given resource constraints (with feasibility currently assessed primarily for port of embarkation to port of debarkation). Similarly, information feasibility addresses the question: "Can we get the required information between applicable nodes given the current information infrastructure that exists [be it the Defense Information Infrastructure (DII) or the DII augmented with whatever commercial and coalition capabilities that can be applied to the problem]?" Unlike transportation feasibility, information feasibility can not be based upon absolute quantities. Transportation feasibility assesses a defined transportation network's ability to move defined forces and sustainment in a defined timeframe.

Information feasibility can not be as precisely defined as transportation feasibility. The information feasibility assessment must consider potentially broken or non-existent operational processes, availability of communications support, and non-compliance with information processes and procedures. As such, determination of absolute information feasibility (i.e., yes or no answer to whether the plan is informational feasible) will rarely occur. Rather, the value of information feasibility will be in determining plans and actions to further overall information value, deployment, employment, and superiority [Norman, 1997].

Information planning should therefore be included as the OPLAN vehicle to implement information feasibility analysis for supporting force employment operations. The information objectives in the OPLAN should reflect an infrastructure analysis, based on IER needs, that will provide the needed information processing assets to combat (and combat support) forces and systems at the time and place needed.

4.3 Initiating the Process

The place to start is with architectures. Operational Architectures must clearly show the vision and resolve to accomplish the tasks necessary to manage information in efficient and effective ways. The Operational Architecture goals must be reflected in the Systems Architecture guided by the Technical Architecture. Operation Plan developers must follow the

architecture lead and do the analysis necessary to determine what information must be moved from node to node to support the activities of the deployed force. The planning must account for the likelihood of allied nations participating in the operation. Planning for the actual use of the information *potential* then becomes an OPLAN task that could utilize the information feasibility process.

4.4 Information Sourcing

In the "deliberate planning" phase of operation planning, forces are chosen to counter opposing forces based upon the mission and course of action anticipated. Initially, forces identified by Unit Line Numbers (ULNs) are selected based upon their "type" of capability. After the force required for an OPLAN is established, real world Units are "sourced" against the particular ULNs (using the Unit Identification Code). Following this, shortfall analyses, improvements in unit capabilities, etc., can be determined.

A similar deliberate planning process can be performed for the information superiority aspects of OPLANs. The information requirements to support combat, combat support, and combat service support forces, can be established as "types" of information required to effectively accomplishing the course of action. Thus, information can be "typed" for the OPLAN, based upon the concept of the operation, versus generically planning to provide all information that could feasibly be transferred between C2 nodes. After establishing the detailed information requirements of the operation, "sourcing" of information requirements can be performed by identifying the particular databases and AIS that will satisfy (partially or totally) the force and geographic needs of the OPLAN [Norman, 1997].

Feasibility analysis can then be performed to determine if the "sourced" information requirement is completely satisfied and to what extent the needed Automated Information Systems (AISs) are accessible at the applicable nodes of the OPLAN. The analysis can also show if the data managed by the AIS supports the operation and its deployment/employment criteria and whether adequate media and systems exist to access the information. From this analysis a schedule to deliver the information when it must be available may be derived.

4.5 Information Requirements

Applying real world data to the concept of information feasibility through the C2 information sourcing process can be a time consuming process. It requires that planners have some knowledge of, or access to, experience in the C2 activities of command nodes. It requires an understanding of the Essential Elements of Information (EEI)[6] that are critical to the success

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6 EEIs are the critical items of information regarding the enemy and the environment needed by the commander by a particular time to relate with other available information and intelligence in order to assist in reaching a logical decision [JPub 1-02, 2000].

of the task(s) defined in the OPLAN. If the EEIs are understood, then the Information Exchange Requirements (IERs) can be obtained through discussions with cognizant individuals throughout the organization. If Joint IERs (JIERs) can be defined then the chances of understanding the information flow between two or more US forces and between allied forces and US are enhanced.

4.5.1 Essential Elements of Information

A framework for establishing EEIs is found in the Chairman of the Joint Chiefs of Staff (CJCS) Universal Joint Task List [UJTL, 1996]. The UJTL identifies actions or processes that are performed as part of joint operations. Tasks that apply to multinational and coalition operations are included in the Universal Joint Task List (UJTL). The task definitions are not doctrine, but are based on joint doctrine, tactics, techniques, and procedures. The UJTL tasks are broken into five categories, National Strategic, Theater Strategic, Operational, (Service) Tactical, and Protect the Force.

One of the sub-tasks under the Operational Category is Task 5, Exercise Operational Command and Control. The UJTL defines command and control "To exercise authority and direction over assigned or attached forces in the accomplishment of the mission." Each of the eight subordinate tasks under Exercise Operational Command and Control task is further broken down to specific defined actions. The C2 activities and actions specifically applicable to multinational/coalition operations are identified in Table 4-1. Most of these tasks support, and are conducive to, the use of information feasibility analysis.

Table 4-1. Operational Task 5: Exercise Operational Command and Control

C2 Task	Sub-Task	Remarks
5.1 Acquire and Communicate Operational Level Information and Maintain Status	5.1.2 Manage Means of Communicating Operational Information 5.1.3 Determine Commander's Critical Information Needs	Includes integrating new headquarters into network. Commander's information requirements should be identified before force deployment
5.2 Assess Operational Situation	5.2.2 Formulate Crisis Assessment	Should be done with total force representation

Table 4.1 (concluded)

C2 Task	Sub-Task	Remarks
5.4 Command Subordinate Operational Forces	5.4.2 Issue Plans and Orders 5.4.4 Synchronize/Integrate Operations 5.4.5 Coordinate and Integrate Components, Theater, and Other Support	Issuing orders, coordinating with components, and synchronizing force activities requires an understanding of information needs and flows among participants
5.5 Organize a Joint Force Headquarters	5.5.1 Develop a Joint Force Command Structure 5.5.4 Deploy Joint Force HQ 5.5.6 Establish or Participate in Task Forces	To maximize effectiveness these actions all require defined information exchange activities.
5.6 Employ Operational Information Warfare (IW)	5.6.2 Plan and Integrate Operational C2 IW 5.6.3 Control IW Operations	Information flow between friendly force C2 nodes is critical.
5.7 Coordinate and Integrate Joint or Multinational and Interagency Support	5.7.3 Develop Multinational Intelligence and Information Sharing Structure 5.7.6 Coordinate Coalition Support 5.7.7 Coordinate Civil Administration Operations	What intelligence information can and can not be exchanged is especially vital to know in advance of deployment.

The US Services are directed to implement the tasks that are defined in the UJTL. As this is accomplished the tasks become more defined. For example, US Air Force doctrine and the C2 CONOPS use a four-category convention to implement the UJTL C2 process. The categories are Dynamic Monitor, Assess, Plan, and Execute. The word dynamic emphasizes the reduced time modern operations permit for monitoring, assessing, planning, and executing decisions. Although the tasks extracted in Table 4-2 is shown separately, in practice all are occurring at once and interacting with one another. This complex and dynamic interaction

makes stringent demands on commanders, C2 staffs, and support tools to provide well-fused information with the correct prospective [Air Force Task List (AFTL), 1998].

Table 4-2. Air Force Task List 7: Provide Command and Control

Monitor Global Conditions and Events	Assess Global Conditions and Events	Plan Military Operations	Execute Military Operations
• Receive, maintain, integrate, and display data from all sources. • Monitor status of global actions and critical events. • Monitor friendly and unfriendly force status. • Monitor Rules of Engagement, treaties, and agreements.	• Assess nature and impact of critical events. • Assess friendly and unfriendly resource status and operations. • Determine military implications of all sources of information • Assess termination options, conditions, and proposals	• Formulate operations objectives. • Merge, generate, and tailor force list and force movements. • Develop and evaluate proposed Courses of Action (COA) and plans. • Select COA or plan.	• Execute COA or plan. • Disseminate information.

The tasks in Table 4-2 are detailed enough to derive specific IERs. The IERs should be based on operational checklists and procedures as well as anticipated coalition information exchange needs. IERs are also used as the starting point for defining the information exchange needs anticipated for C2 centers and nodes.

Architecture development efforts for ongoing initiatives, e.g., the Theater Battle Management Core System (TBMCS) and the North American Aerospace Defense (NORAD) and United States Space Command (USSPACECOM) Warfighting Support System (N/UWSS) have both identified several hundred IERs that are applicable to their system design. Defining this many IERs is a time consuming and expensive process, but was a necessary step in understanding the many information sources, users, and interfaces. In the case of major hub systems like TBMCS and N/UWSS, there is no hierarchy of IERs because all of the functions and information interchanges are presumed to be equally vital. There may come a time during the acquisition phase of these programs, however, when it would be important to understand which IERs have implementation priority. This information could be especially vital if the acquisition is incremental and phased over an extended period of time.

The situation is different for a deployed force that may only need a subset of the total amount of information available at major rearward locations. This subset, however, is vital to the success of the forward operation and must be provided when needed. In addition, information shared with some coalition partners might not be appropriate for release to every coalition partner. In these cases every IERs must be examined to determine the releasibility of the information. Evaluating every possible IER, even for a deployed force or capability, could be a time consuming process. The problem quickly evolves to finding a way to determine the subset of *minimum essential* IERs that can be used to establish C2 information exchanges with the coalition partner. A methodology such as prioritized IERs, and the use of information feasibility analysis, is needed to make the task easier yet still ensure delivery of the EEIs required for conducting effective coalition operations.

4.5.2 Information Exchange Requirements

Information Exchange Requirements are statements that define a specific category of information that needs to be communicated between two parties or organizations. Most commonly IERs are used to define information exchange needs between data processing systems at two or more C2 nodes. Often IER statements are expanded to include additional parameters such as the bandwidth size, how frequently the information is exchanged, and the media over which it will be transmitted. The expanded versions of the IERs are used in modeling and simulation activities to determine or confirm the media bandwidth needed under various scenarios. The Defense Information Systems Agency (DISA), for example, has established a list of 214 IERs that reflect a crisis that evolves into a major war in the Pacific Theater. This set of IERs has been used successfully to model the communications needs in this theater of operations. Validated IERs such as this can also provide a baseline of knowledge and standards for key (mission essential) information exchanges.

The author has used the DISA IER set to identify notional categories of information exchanges. Some of the categories discussed below are more important than others and should take operational priority when activating at a command center.

The goal of the analysis was to examine an incremental approach to putting IERs into operation, especially in situations, such as coalition operations, when extensive nation-to-nation preplanning has not been accomplished. The increments would assign the most essential mission IERs the highest priority for implementation. A few examples of potential Priority 1 IERs are:

- Rules of Operation and Engagement
- Coordinate Multinational Operations
- Courses of Action Selection
- Common Operational Picture
- Constraints on Operations
- Host Nation Support Agreements
- Planning/Alert Orders
- Determine Force Readiness

- Execute/Terminate Orders
- Monitor/Access Actions and Events
- Threat/Intelligence Summary
- Weather Predictions/Forecasts

The IERs identified above might need to be activated en route or at least within an hour after force arrival. The object is to get the coalition operation underway in the minimum amount of time after arrival. The feasibility of actually satisfying each Priority 1 IER in the time and with the connectivity required should be analyzed and planned by priority, and if necessary on an item-by-item basis. If shortfalls are identified for whatever reason (lack of sufficient communications bandwidth, unavailability of equipment at all terminals, insufficient electrical power, missing information, language problems, etc.), commanders at the C2 nodes can be appraised and force activities adjusted appropriately.

Initially the planner must realize that there rarely will be the time and resources to define every aspect of every possible data file, image, and conversation that could take place between C2 nodes of a deployed force. Instead, the more realistic approach would be to identify the top priority IERs that are expected to pass between the *key* C2 nodes of the operation[7].

The information needed to generate IERs would be obtained in the conventional manner, by talking to users of information to find out specifically what is needed and at what point it is absolutely necessary that they have the information. Work sheets, generated for the US forces, possibly by Joint Operation Planning and Execution System (JOPES)[8] could identify the US unit (from the Time Phased Force and Deployment Data (TPFDD)[9].) responsible for assuring the installation of the required equipment necessary to assure each required information exchange. The work sheet might also include the organization responsible for establishing the IER, (e.g., J3), and the information consuming organizations (e.g., J2, J3). The worksheet could also show the UJTL task it supported, the nominal recurrence on which the

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7 The key nodes would include the forward and rear command centers, the command elements of major force organizations, and the equivalent centers of the allied forces.

8 Partner nations would use their equivalent of JOPES. If no automated planning tool exists then the US representative to the planning session could provide a sanitized (if necessary) version of the information feasibility worksheet for use by the non-US representative.

9 The specific *units* (forces), equipment, and deployment delivery schedule are identified in a Joint Operation Planning and Execution System (JOPES) data source called the TPFDD. A TPFDD is developed for each OPLAN. The TPFDD, however, is not an integral part of an OPLAN but is essential to its use. The TPFDD is resident in the JOPES database and resides on electronic media. The TPFDD lists the deployment and employment functions to be performed then assigns combat forces to the functions. The TPFDD also schedules the deployment sequence of all the forces that support the OPLAN [Beckner and Norman, 1998].

information would be exchanged, the approximate file or message format size, classification and survivability requirements of the data, and other information germane to ensuring that the information is properly sourced, planned, and provided. The compiled analysis should then be included in the Information Plan for the operation and perhaps located in one of the OPLAN Annexes. The supporting database could be resident in another document or as part of a Time-Phased Information and Deployment Data (TPIDD), a file similar in concept to the TPFDD.

The supporting information feasibility analysis should be accomplished in coordination with each coalition partner as soon as the coalition is formed. The analysis should establish the likelihood that the priority exchanges can be agreed upon and delivered within the time span required. The team must also examine the systems and media available for the information exchanges, and the schedule for delivery and/or activation of the equipment at the C2 nodes and locations required. At the conclusion of the meeting each nation's individual responsible for the in-theater deployment and installation should be identified. All known shortfalls in establishing IER capabilities should be understood at this time and action assigned to correct each shortfall.

The process described above would be accomplished for lower priority IERs as well. For example, Priority 2 IERs might be those which must be activated and operational within 2-6 hours after force arrival. Likewise, Priority 3 IERs may be those required being operational within the 7-18 hours after force arrival in theater.

The 214 DISA IERs were further analyzed and each assigned one of the three priorities above plus a Priority 4, for implementation 19-36 hours after force arrival[10]. The result of the overall analysis is shown in Table 4-3.

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10 The author presumed that, to support the Pacific Theater scenario, all IERs must be activated within 36 hours.

Table 4-3. Result of Notional IER Prioritization Analysis[11]

Implementation Priority	IER Operational	Per Cent of IERs
Priority 1	0-1 Hours after Force Arrival	7.5
Priority 2	2-6 Hours after Force Arrival	10.7
Priority 3	7-18 Hours after Force Arrival	29.4
Priority 4	19-36 Hours after Force Arrival	52.3

A few examples of potential Priority 2 through 4 IERs are included here for comparison. Priority 2 IERs include Situation Report (SITREP), Establish Target List, Prioritize Targets, Approve Targets, Adversary Order of Battle, and Battle Damage Assessment. Examples of potential Priority 3 IERs include Refine TPFDD, Information on US/Allied Evacuees, Monitor Political Environment, Cultural Data, Indications of (enemy) Coup Attempts, and Updates to Threat and Target lists. Priority 4 IERs would include, for example, Neighboring States Position, International Opinion, Demographics, Surface Transportation Routes, Medical facilities/supplies, and matters such as (friendly) Payroll, Welfare, and Discipline.

If something on the order of 20% or less of the total number of defined IERs represent the absolute minimum essential mission information exchanges initially needed to "jump start" a coalition force, then realistic communications planning, sourcing, and activation can be accomplished. Calculating the feasibility of providing the capabilities for the top priority increments also becomes a task that can be performed within the short planning cycle expected during coalition operations. A valuable byproduct of information feasibility planning is that shortfalls are identified early and operational adjustments can be made while corrective measures are being pursued.

4.5.3 Joint Information Exchange Requirements

The IER equivalent in the joint community is called a JIER. These are IERs that have been approved and adopted across the US DOD. These IERs are particularly valuable because they provide a degree of standardization across the US Services. Developing JIERs certainly is a worthwhile initiative. The next step forward, needless to say, would be Multinational

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11 For simplicity, only four priorities are indicated. Actual implementation may call for a different number of priorities, possibly with operational activation times other than shown. The DOD should, however, establish a standard number of priorities and activation times for TPIDD and Information plans so that Service, Joint, Multinational, and Coalition planners all work with a common understanding.

IERs (MIERs). Although they may not currently be defined as such, there are ongoing efforts, for example the Pacific Theater effort mentioned earlier, to develop IERs that would serve this purpose. This initiative is definitely a step in the right direction and could lead to an eventual MIER designation.

4.6 Information Deployment and Information Plan

Planning for the information to support an OPLAN should occur through a similar process as that for deployment planning of the physical forces. Deployment sequencing must become a common practice. Initially this could happen using relative time (hours and days after deployment start) similar to force deployment sequencing. This includes determining when information needs to be available and leads to advanced planning on how to make it available. Without advanced planning many anecdotes exist that illustrate the true ingenuity of our forces. While these demonstrate "getting the job done," the forces should not have to concern themselves with these aspects of satisfying their information operation requirements. Just as weapons are available ready-to-use, information should come this way also. Providing information is not automatic. Advanced planning must occur to determine the deployment and employment of information. For example, communications media should be planned. The movement of capabilities into the deployed environment versus in garrison should be planned and system interfaces scheduled. There should be a sequencing of these actions just as there is sequencing to moving and engaging forces in the field. Based upon the warfighters' needs in the deployment, various combat and AISs need to be available. Associated with these AISs is the appropriate planning which must occur for moving, installing, maintaining, and buying the required infrastructure and applications [Norman, 1997].

Section 5

Validating Information Feasibility

Information feasibility concepts must be tested in one or more realistic settings to validate the concept and to establish the procedures for use. Battle laboratories, field exercises, and specialized modeling and simulation facilities are designed to do this work.

5.1 Battle Labs, Experiments, and Field Exercises

Before a complex product like a C2 capability is tested in a field environment it may need to undergo integration testing in a non-destructive environment such as a laboratory. The Battle Laboratories are an integral part of the planning for and fielding of capabilities for the warfighter. The Battle Laboratories are committed to a vigorous program of experimenting, testing, exercising, and evaluating new operational concepts and systems. The Air Force Battle Labs, for example, are aimed, both institutionally and operationally, at the established core competencies: Rapid Global Mobility, Precision Engagement, Global Attack, Air and Space Superiority, Information Superiority, Agile Combat Support, and C2[12].

5.2 Modeling and Simulation Communications

There may be a need to establish the characteristics of a feasibility analysis tool or prototype product in a universal situation such as might be encountered in a joint or multinational exercise. A possible candidate for examining a complex use of the information feasibility concept could be the Joint Battle Center (JBC).

The JBC is hosted in the United States Joint Forces Command's Joint Training, Analysis, and Simulation Center (JTASC) facility in Suffolk, VA. The mission of the JBC is to provide US and allied forces a competitive military advantage by effectively assessing joint C4ISR operational capabilities through coherent approaches for the insertion of new technology, and the integration of existing systems into the C4ISR architecture. These approaches are evaluated through joint and coalition training exercises and/or simulated battle scenarios using mission specific assessment parameters with the goal of increasing joint cooperation and operational innovation.

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12 The Air Force Integration Division, AF/XORBB, administers the Air Force Battlelab program.

Section 6

Planning for Information Feasibility

The responsibility for injecting information feasibility analysis into planning lies with the planner. It is particularly important that the Operational Architecture and OPLAN writers focus on this arena because information generation, processing, display, and dissemination are the basic elements of C2 throughout the DOD. As a result, inspired C2 planning can produce efficient and effective capabilities for the decision-makers and warfighters. The designation of C2 as an umbrella "system" or domain for all DOD activities emphasizes the need for thorough planning. Treating information as a commodity whose timeliness and use is paramount to success between operational nodes at every level of every organization-and even nations-is a philosophy that has come of age. It is a concept and capability that planners at all levels must address and employ [Beckner and Norman, 1998].

Section 7

Conclusion

Information is power. Power to intimidate, out maneuver, stun, control, and defeat both military and non-military adversaries. Information is a force and must be treated like any other force. Nations, therefore, should plan for the use and distribution of information like any other force asset.

A strategy for designating some information exchange requirements as *multinational* information exchange requirements for use between allied and US forces may be efficient and cost effective for all parties. This practice will also support situations where the US force information infrastructure may not be totally interoperable (from a technical standpoint) with every coalition partner. The goal, therefore, is not to presume a total exchange of information is feasible, or even desirable. The objective, instead, is to identify the key, in some cases minimum essential, information exchange requirements, and to integrate them into the operational planning process.

Information feasibility analysis is a way to do advanced information planning for employment of assets and forces at home and abroad. The information feasibility process must examine the reality of providing specific information exchanges in the time required, and report all discrepancies and uncertainties to force commanders *before* the deployment begin. This will result in fewer information exchange "headaches" at the deployed C2 nodes, and help establish the timely corrective action needed to resolve information shortfalls. The information feasibility planning structure could be best managed in a distributed, collaborative work environment that includes representatives from all mission areas, the joint community, and when appropriate, allies. Effective use of this technology has the potential to reduce Information Plan development time and would allow existing OPLANs to be quickly tailored to specific capabilities, needs, limitations, and situations.

A time-phased sequence for information employment supporting deploying forces is needed and should be planned as an integral step of information planning for an operation. The supporting information plan would include TPIDD in a way conceptually similar to the TPFDD now maintained and utilized to move and employ other forces. The TPIDD would contain the time when specific information exchange operations need to occur, where they need to occur, and the level of detail through a process similar to that for unit information in the TPFDD. As information itself evolves as a weapon of war, the time-phased information plan becomes the proactive mechanism to define information warfare operations that can be conducted and used if necessary to disrupt adversary operations.

Coalition, and other force commanders, must find the resources to define and prioritize the mission critical operational information exchanges needed to get the deployed force in position and underway. As the subsequent information requirement priorities are incremented,

using information feasibility analysis leveraging, coalition operations can expect to achieve early and orderly force dominance through information superiority.

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Glossary

AFB	Air Force Base
AFTL	Air Force Task List
AIS	Automated Information System
ASD	Assistant Secretary of Defense
C2	Command and Control
C3I	Command, Control, Communications, and Intelligence
C4ISR	Command, Control, Communications, Computer, Intelligence, Surveillance, and Reconnaissance
CCRP	C4ISR Cooperative Research Program
CINC	Commander in Chief
CJCS	Chairman of the Joint Chiefs of Staff
DII	Defense Information Infrastructure
DISA	Defense Information Systems Agency
DOD	Department of Defense
EEI	Essential Elements of Information
IER	Information Exchange Requirement
ICCRTS	International Command and Control Research and Technology Symposium
IW	Information Warfare
JBC	Joint Battle Center
JIERs	Joint IERs
JOPES	Joint Operation Planning and Execution System
JTASC	Joint Training, Analysis, and Simulation Center
MIERs	Multinational IERs
MIM	Mission Information Management
N/UWSS	NORAD and USSPACECOM Warfighting Support System
NORAD	North American Aerospace Defense
OPLAN	Operation Plan
SITREP	Situation Report

TBMCS	Theater Battle Management Core System
TPFDD	Time Phased Force and Deployment Data
TPIDD	Time Phased Information and Deployment Data
UJTL	Universal Joint Task List
ULNs	Unit Line Numbers
US	United States
USSPACECOM	United States Space Command